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AGARD HIGHLIGHTS.(U)

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AGARD

ADVISORY GROUP FOR AEROSPACE RESEARCH & DEVELOPMENT

HIGHLIGHTS

LEVEL 1A



NORTH ATLANTIC TREATY ORGANIZATION



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↓ Partial Contents: (11) Sep 80

(12) 24

MANY MEN PASS BY ...	3	Jack Burnham
AASC MEETING;	5	
VON KARMAN MEDALS 1980 ;	6	
AGARD DIRECTOR'S REPORT TO THE NORTH ATLANTIC MILITARY COMMITTEE;	8	
THE NEW AGARD MULTILINGUAL AERONAUTICAL DICTIONARY;	11	Ir Axel Tan
PARIS PANORAMA	14	
AGARD MEETINGS 1981,	17	
OBITUARIES	22	

(14) AGARD HIGHLIGHTS-80/2

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THE MISSION OF AGARD

The mission of AGARD is to bring together the leading personalities of the NATO nations in the fields of science and technology relating to aerospace for the following purposes:

- Exchanging of scientific and technical information;
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Providing scientific and technical advice and assistance to the North Atlantic Military Committee in the field of aerospace research and development;
- Rendering scientific and technical assistance, as requested, to other NATO bodies and to member nations in connection with research and development problems in the aerospace field;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community.

The highest authority within AGARD is the National Delegates Board consisting of officially appointed senior representatives from each member nation. The mission of AGARD is carried out through the Panels which are composed of experts appointed by the National Delegates, the Consultant and Exchange Programme and the Aerospace Applications Studies Programme. The results of AGARD work are reported to the member nations and the NATO Authorities through the AGARD series of publications of which this is one.

Participation in AGARD activities is by invitation only and is normally limited to citizens of the NATO nations.

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Many men pass by....



When the experienced AGARDians speak about AGARD they tell stories about its Great Men, the brilliant minds, the achievers, the sombre, the humorists, the flamboyant — all types of men who have had a part in the making of the organization. Many talented men have passed by, each with his special forte, and yet we have another one.

On December 31st of this year, Rolland A. Willaume will retire after twenty-eight years of unique service to AGARD. Service that began at the beginning under the leadership of Professor Dr Theodore von Kármán. For it was in 1952 when Theodore von Kármán founded AGARD, that he asked for assistance from the French Authorities to establish the original AGARD office in Paris and was offered help in the personage of Rolland Willaume.

In his notes, Professor von Kármán wrote "... with the help of Rolland Willaume, our able assistant in Paris, we organized the First General Assembly of AGARD, a meeting of scientific representatives of twelve nations.... AGARD would be an important nucleus in the modern revival of internationalism that my Father had dreamed of a half century ago."

Mr Willaume was born 13 December 1915 in Paris where he completed his higher general education by obtaining the State Diploma. He was drafted for military service in 1935 and during the Second World War joined the Free

French Forces, receiving his "wings" as a fighter pilot both from France and the United States of America after attending Flying Training School in the USA during 1943 and 1944. He was awarded the Croix de Guerre and a number of other military decorations.

After the war, in 1946, he joined the Office National d'Etudes et de Recherches Aérospatiales as a research engineer working especially in aerodynamics and flight test techniques. In 1947 he was appointed Head of the Foreign Department of ONERA with responsibility for liaison with foreign aeronautical research centers, and he was a member of a number of technical missions investigating the international use of aeronautical research facilities.

When AGARD's trial period ended in 1954, he found himself in the post now known as Director of Plans and Programmes. He still occupies this position, in which he has had, for the last twenty-eight years responsibility for long-range planning of the Agency's programmes and for liaison with each of the NATO Nations' governments for the implementation of the AGARD programmes. He has also been directly responsible for the organization of the AGARD Lecture Series and Consultant Programme which disseminate amongst all the NATO Nations the latest information in all the research and development disciplines. He has himself taken part in a large number of technical missions for AGARD and, on behalf of Dr von Kármán, was responsible for the detailed planning which resulted in the establishment of the von Kármán Institute for Fluid Dynamics, at Rhode-St-Genèse, Belgium. During his thirty-odd years of experience of military and civil aeronautical and space research in the international field, he has, apart from those operations in which he has been actively engaged himself, frequently acted as a catalyst activating other people and other organizations within the international aerospace field. His services to France and to NATO have been recognized by the rank of Officier de la Légion d'Honneur, Officer of the Order of King George I (Greece), Commander of Merit of the Italian Republic, Chevalier de l'Ordre de la Couronne (Belgium), Officer of the Order of Leopold (Belgium), Commander of Merit of the Federal Republic of Germany, and award of the United States Air Force Scroll of Appreciation, and the AGARD von Kármán Medal. He was the founder President of the Association of French Flying Personnel graduated in the United States, and also a founding member of the French Association of Astronautics and he has continued as a member of the governing body of the von Kármán Institute since its founding.

Mr Willaume is married to the former Camille Marion and they have three children.

And so experienced AGARDians speak about AGARD and mention Rolland Willaume. The newcomers speak about him too, for in one way or another, he has touched so many of us. Great men will laud him and honour him. As for us, we wish him a long life and a happy retirement. He was in at the beginning. Much of the strength of the organisation as he leaves it is the result of his work and his enthusiasm.



Jack Burnham
Director, AGARD



Front cover:

THE HAGUE, NETHERLANDS

Looking out over the Hofvijver to the buildings of the Binnenhof which house the Dutch Parliament and various government departments. Here, the Rolzaal (or Court Room) is the venue for the 49th AGARD National Delegates Board Meeting, in October 1980.

Photo: Courtesy Verzameling Gemeente Archief van 's-Gravenhage

Meeting of AGARD Aerospace Applications Studies Committee (AASC)

Photograph is of participants at the 18th Meeting of the AASC which was held at the 'SEFT' (Section d'Etude et Fabrications des Telecommunications) at Issy les Moulineaux, near Paris, on 19-21 May 1980.

This was the first Meeting at which Mr H.A.Zwemer was Chairman, and he will hold this position for three years. It was also the last Meeting for Lt Col. J.F.Giebel (SHAPE), and for Col. C.N.Beer (USA) who will be replaced by Gen. Rosenberg (USA). Dr J.Dathe's last Meeting will be in Brussels in the Fall when he will attend with his replacement, Mr O.Siellass.



Left to Right: Mr D.J.Walters (UK), Ing. en Chef A.Queinec (FR), Col. H.Lankhorst (NATO-IMS), Col. C.N.Beer (US), Ing. Gen. R.Marguet (FR), Mr J.B.Scott-Wilson (UK), Mme J.Radisson (Interpreter), Mr H.A.Zwemer (US), Dr J.Dathe (FRG), Mr J.Burnham (AGARD Director), Col. R.H.Evans (NATO-IMS), Mlle M.-C.Mazoud (Interpreter), Mme A.Person (AGARD), Dr J.Topp (AGARD), Lt Col. J.F.Giebel (SHAPE), TSgt J.Barnes (AGARD), Dr-Ing. R.Barth (FRG), Col. P.Pryor (AGARD).

Award of Von Kármán Medals for 1980



E.H. Hermann Schlichting

Professor Emeritus Dr Phil. Dr-Ing. E.H.Hermann Schlichting is recognized as one of the most distinguished scientists and lecturers in the field of aerodynamics and fluid mechanics. Professor Schlichting was educated at the university of Göttingen ending with a thesis in 1930. He began his scientific career as a staff member of Ludwig Prandtl's Kaiser-Wilhelm-Institut für Strömungsforschung in Göttingen, joined Dornier Aircraft for three years, became in 1938 a full professor of fluid mechanics at the Technical University of Brunswick and had in addition appointments as a Director of the Institut für Aerodynamik in the German Research Establishment of Brunswick (1955–1971) and as a scientific director of the Aerodynamische Versuchsanstalt Göttingen-AVA from 1957 to the year of his retirement in 1975. Professor Schlichting's connection with AGARD dates from 1955, when he became a member of the Fluid Dynamics Panel. He served AGARD continuously up to 1975, from 1961 to 1963 as Chairman of the Panel. His contribution to the work of the Panel has been outstanding thanks to his extensive knowledge of most of the Panel activities. One can mention in particular: boundary layer flow, stability and transition, turbulence, sub- and supersonic wing theory, drag and interface problems, cascade flow, and wind tunnels. Professor Schlichting is the author of one of the best-known books on boundary layer theory and of another on wing theory, together with E.Truckenbrodt.

Two von Kármán Medals will be awarded for 1980 – to Frank Thurston of Canada and Herman Schlichting of the Federal Republic of Germany, respectively. The formal presentations will take place at the AGARD National Delegates Board Meeting in The Hague in October 1980. Reproduced below, along with photographs of the recipients, are the texts of the citations which accompany the medals.



Frank Thurston

Mr Frank Thurston has been associated with AGARD since its early days both as a member of the Fluid Dynamics Panel and of the Structures and Materials Panel. Deputy Chairman in 1955 and Chairman of the Structures and Materials Panel from 1957 to 1960, he played a leading role in the rapid and efficient growth of the Panel. Thanks to his able guidance and diplomacy he established a unique method of working, using a number of sub-groups and sub-committees. This pattern has since been adopted by other Panels. As Canadian National Delegate from 1960, he contributed to the efficiency of the Board's achievements. Appointed AGARD Chairman in 1976, he conducted the work of the Board with great enthusiasm and perspicacity, and was instrumental in setting up the initial paths for Project 2000. Since 1976 Frank Thurston has shown great interest in directing AGARD efforts to assisting the smaller nations. Mr Thurston enjoys an international reputation in Canada as Director of the National Aeronautical Establishment, NRC, a post he held from 1959 to 1979, and as a Director of the Canadian National Research Council. He is the author of numerous publications on the theory of structures and on aerodynamics.

AGARD Director's Report to the North Atlantic Military Committee

(Following is the text of a verbal presentation delivered on 26 June 1980)

Mr Chairman, Gentlemen,

In speaking to you today, I become one of the few Directors of AGARD who has had the privilege of addressing this Committee twice in the same year, having in January been one of the team which presented to you the results of Project 2000.

The AGARD Charter sets out the Mission of AGARD, as shown below. It may be summarised as first assisting the collaboration between the member nations in aerospace research and development and, secondly, carrying out such specific activities as this Committee may instruct and the AGARD Board of National Delegates, acting on behalf of the Nations, agree to support. The latter caveat is important. In fact, most of the cost of AGARD activities falls on the nations; the AGARD Budget is but a small fraction of it and the AGARD Budget is a small one.

AGARD Mission

- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community;
- Providing scientific and technical advice and assistance to the North Atlantic Military Committee in the field of aerospace research and development (with particular regard to its military application);
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving cooperation among member nations in aerospace research and development;
- Exchanging of scientific/technical information;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
- Rendering scientific and technical assistance, as requested, to other NATO bodies and to member nations in connection with research and development problems in the aerospace field.

The way we go about our business in terms of Meetings and Conferences (of which there are about forty per year), Working Groups, Lecture Series, Studies, etc. is, I think, fairly well known. AGARD's NATO budget is spent primarily on two things: first, in providing a Headquarters Staff to arrange and coordinate our activities and, secondly, in publishing about 100 books, a total of 15,000 pages per year. Without doubt these publications form the largest and most up-to-date library of technical aerospace documentation in the free world. The management of the AGARD publications programme is an important part of our job, and in practice it is a far from trivial one.

Method of Accomplishing Mission

- Panel programmes of Conferences, Symposia and Specialists' Meetings, and meetings of sub-committees and working groups;
- Consultant and Exchange Programmes under which individual consultants are provided to NATO member nations, Lecture Series are organized and personnel exchanges and contacts arranged;
- A programme of Military Committee Studies, consisting of aerospace applications and technology studies initiated at the request of the NATO Military Committee;
- A publications programme resulting from the above activities or initiated by them.

I would like to make some remarks now about a follow-on to P.2000. At its meeting in March this year, the AGARD National Delegates Board approved the next Aerospace Applications Study, AAS 13 (see below); the Study Group has had its first meeting and a good start has been made. This Study concerns the possibilities of the reduction of the ability of an adversary to observe the presence of an air vehicle by reducing radar, infra-red, acoustic and other signatures; the practicability and the penalties in performance, operational utility and cost. As can be seen, there are four Nations participating in this study.

Aerospace Applications Study 13 – Signature Reduction

To study the possibilities of the reduction of the ability of an adversary to observe the presence of an air vehicle by reducing radar, infra-red, acoustic and other signatures; the practicability and the penalties in performance, operational utility and cost.

Participants: Federal Republic of Germany
France
Italy
United Kingdom

In addition to this signature reduction topic, I mentioned three other possible topics for study in the light of the results of P.2000 when I spoke during the P.2000 presentation in January. These were V/STOL, High-Altitude RPVs and the Role of the Man in the Cockpit. Following the presentation in January these ideas have been further refined by the AGARD Aerospace Applications Studies Committee and you may be interested to know the possibilities which, as a result, will be put to the meeting of the National Delegates Board in October, when it is hoped that a topic for AAS 14, starting in January 1981, will be selected.

The possible V/STOL study has become "Mission Applications of V/STOL Combat Aircraft" (shown below) and would seek to determine the combat missions for which a V/STOL aircraft may be attractive in the 1990's and would attempt to determine the trade-off between airborne and ground capabilities of such systems considering performance and cost penalties and to define the future work needed to provide optimum aircraft solutions.

Possible Aerospace Applications Study Mission Applications of V/STOL Combat Aircraft

Determine the combat missions for which a V/STOL aircraft may be attractive in the 1990s. Determine the trade-off between airborne and ground capabilities of such concepts considering performance and cost penalties. Define the future work needed to provide optimum aircraft solutions.

The possible RPV topic has become "High-Altitude Unmanned Air Vehicles as Sensor Platforms" (see inset) and would seek to determine the operational capability of advanced high altitude air vehicles as platforms for surveillance systems. It would consider the vehicle design rather than the design of the system as a whole but would include consideration of launch and retrieval systems and vehicle control, together with the associated ground equipment.

Possible Aerospace Applications Study High-Altitude Unmanned Air Vehicles as Sensor Platforms

Determine the operational capability of advanced high-altitude air vehicles as platforms for surveillance systems, considering the vehicle design rather than the design of the system but including consideration of launch and retrieval problems and vehicle control, together with the associated ground equipment.

The final topic mentioned in January, that of the role of the man in advanced military aircraft, was discussed by the Aerospace Applications Studies Committee (AASC). They felt unable at this stage to define firm Terms of Reference of a possible study and wish to give further thought to the matter. It was clear to them that the bounds of such a study should be restricted if progress were to be made. Their present idea would be a study of tactical aircrew performance limitations, aiming to determine the approximate point where further increases in aircraft system complexity would degrade operator performance to an unacceptably low level and in particular the study would examine the single-place versus two-place cockpit issue for the tactical air-to-ground role.

Tentative Aerospace Applications Study Topic Needing Further Consideration Tactical Aircrew Performance Limitations

Determine the approximate point where further increases in aircraft system complexity would degrade operator performance to an unacceptably low level. Examine the single-place vs two-place cockpit issue for the tactical air-to-ground role.

Much other AGARD activity concerns technological topics which may be as foreign to most of you as the discussion of strategic and tactical military doctrines would be to a technologist like myself. Much of our activity is a dialogue between Alliance technologists. I will not go into detail about most of the subjects AGARD plans to consider in 1981, which are described in the document which has been circulated to you. Software is not only a NICSMA problem, we are concerned about it and trying to work on it.

I would, however, like to make two points. First, that some of these apparently abstruse scientific topics we consider do directly affect the serviceability and cost of NATO air fleets as they exist today. For example, corrosion,

corrosion fatigue, the maintenance of high-temperature parts, and fatigue testing methodology. Secondly, we in AGARD have been much impressed by the value of the debate, in the forum of P.2000, between the military and the technologists. This was far from being a dialogue of the deaf. There are a number of subjects in the 1981 AGARD Programme, for example: The Impact of Military Applications on Rotorcraft and V/STOL Aircraft Design, The Impact of New Guidance and Control Systems on Military Aircraft Cockpit Design, Combat Aircraft Manoeuvrability, and The Impact of Advanced Avionics Technology on Ground Attack Weapon Systems. The value of our discussions on topics such as these would be greatly enhanced by more and better contributions from the military users and planners and we would like to see stronger and more active participation from the national military services and from the NATO commands.

Finally, I would like to comment on the one significant new item which appears in the 1981 Proposed Programme and Budget for AGARD. A year ago AGARD, in common with other NATO Agencies, was asked what further efforts were possible to improve the defence industry base of the nations of the NATO Southern Flank. We have discussed this in depth, both with the nations concerned and with those who might be able to make assistance available; the matter was considered by the AGARD National Delegates Board when it met in March this year. The Board concluded that worthwhile results should be possible for the relatively small expenditures for which money might be found and that a specific new effort to give assistance to Greece, Turkey and Portugal should be made. Since the Board, after careful consideration, decided cuts could not be sensibly made in existing activities I was instructed by the Board to request an additional 500,000 French Francs (roughly US \$ 100,000) in the 1981 AGARD budget submission and to discuss with the nations concerned and with AGARD experts, and put forward for approval at the meeting of the National Delegates Board in October, specific proposals upon which such resources might be used. These discussions are well advanced and, to help us, the military Budget Committee has agreed that this year their hearings on the AGARD Budget will be taken in November. I believe that the nations concerned agree with me that very valuable and immediately useful assistance can be given to them in this way despite the small sums involved.

That concludes my formal presentation. I am, of course, happy to try to answer any questions you may have.

THE NEW AGARD

Multilingual Aeronautical Dictionary

by

Ir. Axel Tan

(Chairman, AGARD Technical Information Panel)

As Chairman of the Panel responsible for co-ordinating the preparation of the new Multilingual Aeronautical Dictionary (or MAD, as everybody knows it), I cannot help feeling rather proud of the fact that this magnum opus is at last complete. As I write, the final proof has been approved and this 900-page volume will soon be coming off the press. The first copies are due to go to the SBAC Show at Farnborough where they will be on display and sale on the NASA Stand.

I must confess also to some feeling of relief that our labours are, for the moment, at any rate, at an end. The fact is that this task was started long before my tenure of office commenced as Chairman of TIP, but having regard to the nature and scale of the work involved this is hardly surprising. On occasion I have heard criticism of the seemingly endless period of gestation of the dictionary, but in this connection I must remind any would-be critics that the first edition of the MAD was seven years in the making, from 1953 to 1960. One has to bear in mind that our new edition of the dictionary not only contains over 7,300 terms, but also has had to be translated into nine languages, in addition to the original English text (and, for the record, this is two more than the original version since we have now added Greek and Portuguese). Moreover, one has to remember that AGARD is not in the business of publishing dictionaries. In a sense, we are very much amateurs in this kind of thing. On the other hand, perhaps because of our training as engineers and scientists, we have a very clear comprehension of what is meant by 'quality control' and I can tell you that those of us intimately concerned with the jigsaw-like job of putting together all the constituent inputs for the dictionary have been at pains to turn out a product which is both worthwhile and reliable.

Since this article is addressed to my AGARD colleagues, I might perhaps mention that the first version of the dictionary was not without its gaffs and howlers. If you or your parent organization is prepared to lay out US \$ 120, (as I am sure you all will be!) you can play the game of finding the howler in the new edition, but I trust your efforts will not be too well rewarded.

Why have we gone to all the trouble to produce the MAD Mark II? Theodore von Kármán, in his Foreword to the original MAD, expressed the belief that "one of the fundamental conditions of exchange of scientific information is the exact definition of scientific and technical concepts and the knowledge of the corresponding terminology in the various languages of NATO" and that, I think, says it all. You will recall that in the front of every AGARD publication we publish we state the Mission of AGARD and the first item in the list is "Exchanging of Scientific and Technical Information". Let us hope that all the effort that has gone into this dictionary since work first started in 1973 will contribute something to the achievement of this part of our Mission.

It is interesting that none of the present members of the MAD Sub-Committee, and indeed none of the AGARD Staff involved, were in at the beginning of the project, so it would be courteous and proper to express some thanks here to those who went before, so to say. It is impossible to make reference to all those who have contributed but I would mention, in particular, Colin Schuler of the UK (now retired, but previously the Head of the Defence Research Information Centre in England and Chairman of the MAD Sub-Committee during the very active formative phase of the programme). Also, Hal Pryor, who for several years ran the Scientific and Technical Information Office in NASA, in Washington,



AXEL TAN, who works at the National Aerospace Laboratory in Amsterdam, The Netherlands, joined the AGARD Technical Information Panel in 1976 and is presently its Chairman.

whose contractors were used for the very sophisticated software preparation job which served as the basis for the computer setting of the dictionary. Coming up to date, I would like to express my personal thanks to two of my Panel colleagues, who have been heavily involved in the final phase of the work – namely, Joe Coyne, the present Sub-Committee Chairman, who works with the US Department of Energy at Oak Ridge, Tennessee, and George Chandler of NASA. Finally, while as a matter of principle I would not normally include a vote of thanks to a contractor (after all, they get paid for what they do), my Panel would insist, I am sure, that we make clear our great indebtedness to Kathryn Mews, who nearly worked herself into a nervous breakdown by toiling endlessly and tirelessly over a period of some 18 months to try to resolve discrepancies, anomalies and many other kinds of undesirable oddities that somehow managed to creep into the work of the many Panels, national translators, and so on. Her extraordinary competence in the various languages concerned and encyclopaedic knowledge of the language of aerospace must be just about unique. The debt we owe her is enormous.

Finally, let me come to my sales pitch! I hope all of you will feel able to commend the dictionary to

colleagues and to organizations, be they commercial, learned associations, or whatever, with which you are associated. We have split the sales programme for the MAD into two parts: sales in North America, Canada and Mexico are being handled by NTIS, Dept of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161, USA. For the rest of the world, sales are being handled by the office of the Scientific Publications Executive at AGARD in Paris. As I mentioned, the dictionary has a basic cost of US \$ 120 and, in this day and age, I reckon this is a bargain.

Why, almost uniquely among AGARD publications, is the MAD on sale to the public? The answer is that, based on the experience we gained with the earlier version, it would be unreasonable to seek to keep a work of this scale and interest within the confines of the AGARD family. It is certainly a work for which no parallel exists in terms of its range of content and the number of languages involved. I hope that it may come to be regarded as the best in its class for that would be reward enough for my many colleagues in the various AGARD Panels who gave their time and knowledge in sorting and selecting the thousands of terms which formed the raw material for the task.



The AGARD Multilingual Aeronautical Dictionary

HAS BEEN PREPARED WITH THE ASSISTANCE OF SOME 250 OF THE LEADING AEROSPACE SCIENTISTS AND ENGINEERS OF THE NATO NATIONS. It is a unique and indispensable reference book published primarily for distribution to government departments and agencies within NATO. A limited number of copies are being made available for world-wide sale to the general public.

SEE ORDER FORM ENCLOSED WITH THIS "HIGHLIGHTS"

ORDER YOUR COPY NOW....

FR 1. moteur (m) en W
2. moteur (m) en flèche
HE 1. τοξοειδής κινητήρας (m)
2. κινητήρας (m) τύπου W
IT motore (m) a W
NE W-motor
PO 1. motor (m) em W
2. motor (m) em seta
RU 1. двигатель (m) с W-образным расположением цилиндров
2. W-образный двигатель (m)
TU W tipi motor

10595
arrowhead wing A wing of V-shaped planform, either tapering or of constant chord, suggesting a stylized arrowhead

DE Pfeilflügel (m)
ES ala (f) en flecha
FR aile (f) en flèche
HE βελόμορφος πτέρυξ (f)
IT ala (f) a freccia
NE pjlvlæugel
PO asa (f) em flecha
RU стреловидное крыло (n)
TU W tipi kanat

10596
articulated blade A blade connected to the rotor head by flapping, lag and feathering hinges (fully articulated) See 'semi-rigid rotor'

DE gelenkig angeschlossenes Blatt (n)
ES pala (f) articulada
FR pale (f) articulée
HE αρθρωτός πτερυγίον (n)
IT pala (f) articolata
NE scharnierend blad (n)
PO pa (f) articulada
RU 1. шарнирно-подвешенная лопасть (f)
2. лопасть (f) с шарнирным креплением
TU mafsalik pal

10597
articulated rotor See 'arti'

DE Gelenkrotor (m)
ES rotor (m) articulado
FR rotor (m) articulé
HE αρθρωτός στροφέιον (n)
IT rotore (m) articolato
NE scharnierende rotor
PO rotor (m) articulado
RU несущий винт (m) с шарнирно-подвешенными лопастями
TU mafsalik rotor

10598
articulation index (AI) A related measure of the intelligibility of processed speech, taking limitations of the transmiss background noise. The articulation index in magnitude between 0 and less than 0.1, speech intelligibility is above 0.6, speech intelligibility high.

DE Verständlichkeitsfaktor (m)
ES índice (m) de articulación
FR indice (m) d'articulation
HE δείκτης (m) εύρησιμότητας φωνημάτων
IT indice (m) di articolazione
NE artikulete-index
PO índice (m) de articulação
RU индекс (m) артикуляции
TU kanyma endisi

10599
artificial ageing Ageing at temperature to obtain precipitate from the super-saturated solid

DE 1. künstliche Alterung (f)
2. künstliches Altern (n)
3. Warmaushärten (n)
4. Warmauslagern (n)
ES envejecimiento (m) artificial
FR vieillissement (m) accéléré
HE τεχνητός γήρασμός (m)
IT invecchiamento (m) artificiale
NE kunstmatig verouderen
PO envelhecimento (m) artificial
RU искусственное старение
TU suni yaslandirma

10600
artificial feel A control feel simulated by mechanisms sometimes incorporated in the control system of an aircraft where the forces acting on the control surfaces are not transmitted to the cockpit controls

DE 1. simulierte Steuerkraft (f)
2. künstliches Steuergefühl (n)
ES sensación (f) artificial
FR 1. sensation (f) artificielle
2. restitution (f) d'effort artificiel
HE τεχνητή αίσθηση (f)
IT sensazione (f) artificiale
NE kunstmatig (stuurkracht) gevoel (n)
PO sensação (f) artificial
RU искусственное восприятие (n)
УСИЛИЕ

TU 1. suni hissetme
2. yapay duygu

10601
artificial gravity Simulation of a gravitational field in weightless conditions by the imposition of a centrifugal force achieved by rotation of a space vehicle.

DE künstliche Schwerkraft (f)
ES 1. gravedad (f) artificial
2. gravedad artificial

10606
A scan See 'A-scope'

10607
asco-gyro Abbreviation for 'astrocompass directional gyro'
DE Astrokompass-Kurskreisel (m)
ES astrocompás (m) giroscópico
FR astrocompas gyroscopique (m)
HE γυροσκοπική άστροπύξ (f)
IT astrobussola (f) giroscopica
NE ...
PO astrobússola (f) giroscópica
RU 1. астроконпас-гирокоп (m)
2. аскоро (n)
TU asko-jayro

10608
A scope A scan or A-type display A range-amplitude display in which the range displacement or time base is sensibly linear.

DE A-Bildschirm (m)
ES indicador (m) tipo A
FR indicateur (m) type A
HE ένδεικτης (m) παντάρ τύπου Α
IT visualizzatore (m) tipo A
NE A-scherin (n)
PO ekran (m) tipo A
RU индикатор (m) типа 'A'
TU A-skobu

10609
ASDIC See 'sonar'

10610
ash content The solid residue remaining after a reinforcing substance has been incinerated or strongly heated.

DE Aschegehalt (m)
ES contenido (m) en cenizas
FR teneur (f) en cendres
HE περιεκτικότητα (f) εις τέφραν
in ceneri

le cinza
(f)
(n) zony

A change in the appearance
t when viewed by radar from

rg (f)
aspecto
spect

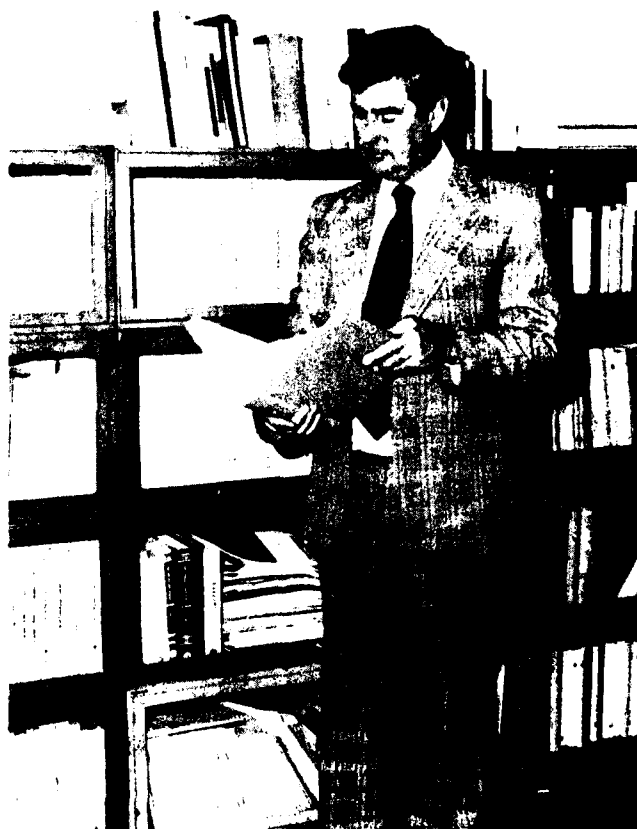
m) d'aspetto
1. aanzicht
aspecto
(n) πανορτα
(n) eada
ni

e ratio of the square of the
ea of an aerofoil.

n)
1)
λεπτότης (f)
ni

n)
удлинение (n)
1. korda oran (kanat epkljg)

Aircraft which move assault
on an objective area and which
supply or fire support.



AGARD PUBLICATIONS EXECUTIVE, Trevor Sharp, holding the printer's original 'dummy' of the Dictionary. The background is a specimen page from the book.

PARIS PANORAMA

ANGLO-FRENCH CONSORTIUM. Major General P.B. Cavendish of the International Military Staff at NATO, a member of AGARD's Steering Committee, Ing. Gen. P. Naslin, Head of the Defence Research Section in the NATO Defence Support Division at Brussels, and Dr J. Dunham, Chairman of AGARD's Propulsion and Energetics Panel, from the National Gas Turbine Establishment at Pyestock, UK.



FRG NATIONAL COORDINATOR Dr-Ing. R. Barth, from the MOD, Bonn, talking with one of his country's National Delegates, Dr-Ing. J. Barche, and his wife.



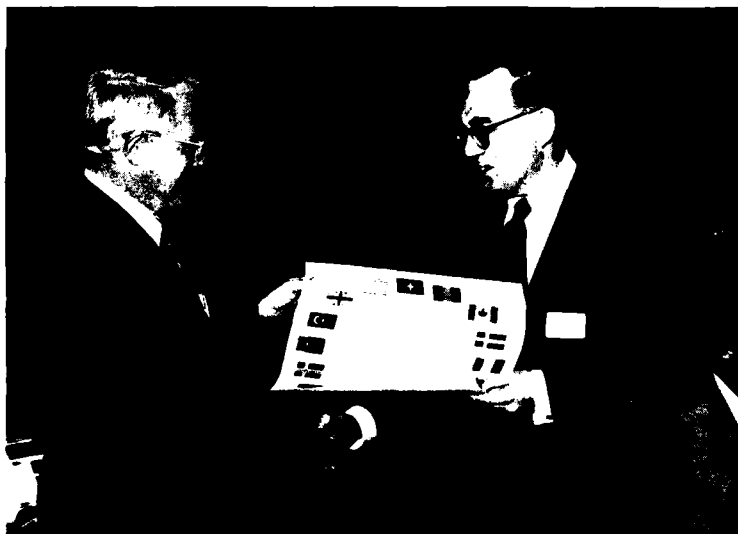
GREETING THEIR GUESTS at the Reception in the Le France building in Neuilly, Jack and June Burnham, the AGARD Director and his wife, pleasantly managed to make an informality of the formalities.



PORTUGUESE NATIONAL DELEGATE, Major General Bourbon and his charming wife, seen here at the AGARD Director's Reception for those attending the 48th National Delegates Board Meeting.

**PHOTOS FROM THE MEETING
OF THE AGARD NATIONAL DELEGATES BOARD – SPRING 1980**

**FLIGHT MECHANICS PANEL
TRIO** – On the left the FMP
Executive, Trevor Wilcock, at the
Panel Chairmen's Meeting which was
presided over by M. l'Ing.
J.F.Renaudie, current FMP Chairman
(centre), seen here mulling over the
agenda with his Deputy Chairman,
R.J.Belrose, from British Aerospace,
Kingston-upon-Thames, UK.



FLAGS OF THE ALLIANCE
decorate the certificate for
recently-retired UK National
Delegate John Alvey, being
received here on his behalf by
Dr E.W.E.Rogers of the RAE
Farnborough from the hands of
NDB Chairman
Dr Alan M.Lovelace.

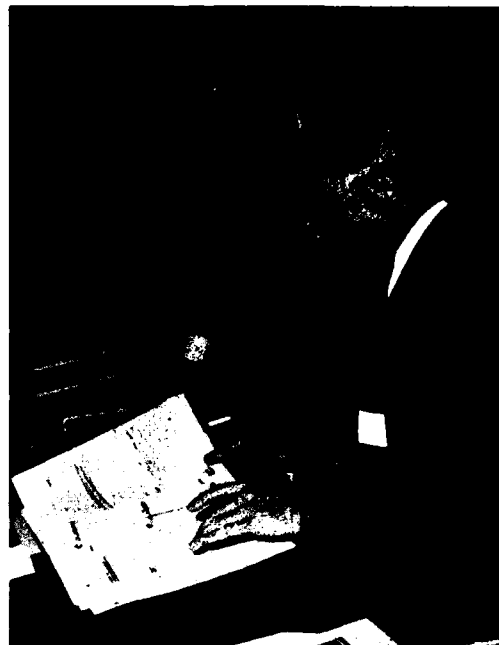
**PANEL OFFICERS IN
SESSION.** From left to right,
the Technical Information
Panel Chairman, Ir A.S.T.Tan:
the Fluid Dynamics Panel
Executive and Chairman,
Mr R.Rollins II and
Dr K.J.Orlik-Rückemann: the
Avionics Panel Chairman
Dr Ing. M. Vogel, the AVP/EPP
Executive Lt Col. J.B.Catiller,
and finally Dr J.S.Belrose,
Deputy Chairman of the
Electromagnetic Wave
Propagation Panel.



PARIS PANORAMA continued



AT THE CERCLE MILITAIRE, Canadian National Delegate Frank Thurston meets friends of long standing, AGARD Honorary Vice-Chairman Frank Wattendorf and his wife.



COMPARING NOTES during the coffee break in one of the NDB Open Sessions, the AGARD Director takes a look at the Chairman's dossier.

CLEARLY IN GOOD SPIRITS, Geoff Howell, Deputy Chairman of the Guidance and Control Panel, being received by Prof. L. Malavard on the occasion of the Reception given by the French Authorities at the Cercle Militaire.



EX-OFFICIO NATIONAL DELEGATES BOARD member, Mr John B. Walsh, Assistant Secretary General, Defence Support Division, at NATO Headquarters enjoying a drink at the AGARD Director's Reception.

**CALENDAR OF PLANNED MEETINGS
1981**

<i>Tentative Dates</i>	<i>Location</i>	<i>Panel</i>	<i>Type of Meeting/Subject</i>
2-5 March	UNITED STATES (NASA-Ames, Moffett Field)	Fluid Dynamics	Lecture Series No.114 Dynamic Stability Parameters
16-19 March	BELGIUM (VKI, Brussels)	Fluid Dynamics	Lecture Series No.114 Dynamic Stability Parameters
25-27 March	FRANCE (Paris)	Headquarters	50th National Delegates Board Meeting 30th Panel Chairmen's Meeting 11th National Coordinators' Meeting 30th Steering Committee Meeting
30 March-3 April	NETHERLANDS (Soesterberg)	Aerospace Medical	Specialists' Meeting on Aural Communication in Aviation
5-10 April	TURKEY (Çesme)	Structures & Materials	52nd Panel Meeting/Specialists' Meetings on Aircraft Corrosion and Corrosion Fatigue
6-10 April	UNITED STATES (Monterey, Cal.)	Electromagnetic Wave Propagation	Symposium on Special Topics in Optical Propagation (NATO-Secret)
6-10 April	FRANCE (Paris)	Flight Mechanics	58th Panel Meeting/Symposium on The Impact of Military Applications on Rotorcraft and V/STOL Aircraft Design (NATO-Secret)
2-3 April	UNITED KINGDOM (London)	Propulsion & Energetics	Lecture Series No.113 Microcomputer Applications in Power and Propulsion Systems
6-7 April	GERMANY (Munich)	Propulsion & Energetics	Lecture Series No.113 Microcomputer Applications in Power and Propulsion Systems
9-10 April	ITALY (Genoa)	Propulsion & Energetics	Lecture Series No.113 Microcomputer Applications in Power and Propulsion Systems
4-8 May	GERMANY (Stuttgart)	Guidance & Control	32nd Panel Meeting/Symposium on The Impact of New Guidance and Control Systems on Military Aircraft Cockpit Design (NATO-Confidential)
11-15 May 18-20 May	UNITED KINGDOM (London)	Military Committee Studies	AAS 13 & 14 Meetings 20th Meeting of the AASC - Final Review of AAS 13 - Initial Review of AAS 14 - Final Terms of Reference for AAS 15 & 16 - Organization of Study Group 15 (NATO-Secret)
11-15 May	FRANCE (Toulouse)	Fluid Dynamics	48th Panel Meeting/Symposium on Aerodynamics of Power Plant Installation (with participation of PEP)
11-15 May	FRANCE (Toulouse)	Propulsion & Energetics	57th Panel Meeting/Specialists' Meeting on Helicopter Propulsion Systems
22-23 June	FRANCE (Paris)	Aerospace Medical	Lecture Series No.115 Personal Visual Aids for Aircrew

<i>Tentative Dates</i>	<i>Location</i>	<i>Panel</i>	<i>Type of Meeting/Subject</i>
25-26 June	GERMANY (Fürstenfeldbruck)	Aerospace Medical	Lecture Series No.115 Personal Visual Aids for Aircrew
22-26 June	NORWAY (Røros)	Avionics	41st Panel Meeting/Symposium on Tactical Airborne Distributed Computing and Networks
31 August- 1 September	NORWAY (Bølkesjø)	Avionics	Lecture Series No.116 Electromagnetic Compatibility
3-4 September	GERMANY (Munich, Oberpfaffenhofen)	Avionics	Lecture Series No.116 Electromagnetic Compatibility
7-8 September	ITALY (Rome)	Avionics	Lecture Series No.116 Electromagnetic Compatibility
7-11 September	GERMANY (Munich)	Technical Information	34th Panel Meeting/Specialists' Meeting on What Should Users Expect from Information Storage and Retrieval Systems of the 1980's?
16-18 September	UNITED KINGDOM (Oxford)	Headquarters	51st National Delegates Board Meeting 17th Annual Meeting 31st Panel Chairmen Meeting
21-25 September	BELGIUM (Brussels)	Electromagnetic Wave Propagation	28th Panel Meeting/Symposium on Medium, Long and Very Long Wave Propagation (at frequencies less than 3000 kHz)
27 September- 2 October	NETHERLANDS (Noordwijkerhout)	Structures & Materials	53rd Panel Meeting/Specialists' Meetings on Maintenance in Service of High Temperature Parts and Dynamic Environmental Qualification Techniques
1-2 October	NORWAY (Bølkesjø)	Guidance & Control	Lecture Series No.117 Multivariable Analysis and Design Techniques
5-6 October	NETHERLANDS (Delft)	Guidance & Control	Lecture Series No.117 Multivariable Analysis and Design Techniques
8-9 October	TURKEY (Ankara)	Guidance & Control	Lecture Series No.117 Multivariable Analysis and Design Techniques
5-9 October	ITALY (Florence)	Flight Mechanics	59th Panel Meeting/Symposium on Combat Aircraft Manoeuvrability (NATO-Confidential or Secret)
12-16 October	GREECE (Athens, Kavouri)	Guidance & Control	33rd Panel Meeting/Symposium on Guidance and Control Technology for Highly Integrated Systems (NATO-Confidential)
19-23 October	GREECE (Athens, Kavouri)	Avionics	42nd Panel Meeting/Symposium on Impact of Advanced Avionics Technology on Ground Attack Weapon Systems (NATO-Secret)
19-20 October	DENMARK (Copenhagen)	Structures & Materials	Lecture Series No.118 Fatigue Testing Methodology
22-23 October	PORTUGAL (Lisbon)	Structures & Materials	Lecture Series No.118 Fatigue Testing Methodology
26-27 October	GREECE (Athens)	Structures & Materials	Lecture Series No.118 Fatigue Testing Methodology

<i>Tentative Dates</i>	<i>Location</i>	<i>Panel</i>	<i>Type of Meeting/Subject</i>
26-30 October	UNITED KINGDOM (London)	Propulsion & Energetics	58th Panel Meeting/Symposium on Ramjets and Ramrockets for Military Applications (NATO-Confidential)
26-30 October	ITALY (Naples)	Aerospace Medical	38th Panel Meeting/Specialists' Meeting* on Impact Injury Caused by Linear Acceleration: Mechanisms, Prevention and Cost
2-6 November	PORTUGAL (Lisbon)	Fluid Dynamics	49th Panel Meeting/Symposium on Fluid Dynamics of Jets with Applications to V/STOL
9-13 November 16-18 November	UNITED STATES (Washington D.C.)	Military Committee	AAS 14 & 15 Meetings 21st Meeting of the AASC - Final Review of AAS 14 - Initial Review of AAS 15 - Consideration of Proposed AA Studies - Organization of Study Group 16 (NATO-Secret)

SPECIAL COURSES

11-22 May	NETHERLANDS (Delft)	Flight Mechanics	Flight Test Instrumentation Course
4-8 May	BELGIUM (VKI, Brussels)	Fluid Dynamics/ Structures & Materials	Modern Data Analysis Techniques in Noise and Vibration Problems with Particular Emphasis on Aeroacoustic Applications

* This Meeting may be postponed to Spring 1982.
Decision to be made at October 1980, NDB Meeting.

TRADUCTION DES TITRES DES REUNIONS

Titles of Meetings

Titres des Réunions

Aerospace Medical Panel

- | | |
|--|---|
| – Aural Communication in Aviation | – Les Communications Auditives en Aviation |
| – Impact Injury Caused by Linear Acceleration: Mechanisms, Prevention and Cost | – Les Blessures d'Impact causées par l'Accélération Linéaire: Mécanisme, Prévention et Coût |

Avionics Panel

- | | |
|--|---|
| – Tactical Airborne Distributed Computing and Networks | – Calculs Répartis et Réseaux Tactiques Aéroportés |
| – Impact of Advanced Avionics Technology on Ground Attack Weapon Systems | – L'Impact de la Technologie Avancée dans le Domaine de l'Electronique de Bord sur les Systèmes d'Armes pour Attaque d'Objectifs Terrestres |

Electromagnetic Wave Propagation Panel

- | | |
|---|--|
| – Special Topics In Optical Propagation | – Sujets Spéciaux relatifs à la Propagation Optique |
| – Medium, Long and Very Long Wave Propagation (at frequencies less than 3000 kHz) | – La Propagation des Ondes Moyennes, Longues et Très Longues (à des fréquences inférieures à 3000 kHz) |

Flight Mechanics Panel

- | | |
|--|---|
| – The Impact of Military Applications on Rotorcraft and V/STOL Aircraft Design | – L'Impact des Applications Militaires sur la Conception des Giravions et des ADAC/ADAV |
| – Combat Aircraft Manoeuvrability | – La Manoeuvrabilité des Avions de Combat |

Fluid Dynamics Panel

- | | |
|--|--|
| – Aerodynamics of Power Plant Installation | – L'Aérodynamique de l'Installation des Groupes Propulseurs |
| – Fluid Dynamics of Jets with Applications to V/STOL | – La Dynamique des Fluides des Jets, avec Applications aux ADAC/ADAV |

Guidance and Control Panel

- | | |
|--|---|
| – The Impact of New Guidance and Control Systems on Military Aircraft Cockpit Design | – L'Impact des Nouveaux Systèmes de Guidage et de Contrôle sur la Conception de l'Habitacle des Avions Militaires |
| – Technology for Highly Integrated Systems | – La Technologie du Guidage et du Contrôle pour Systèmes à Intégration Poussée |

Propulsion and Energetics Panel

- | | |
|--|--|
| – Helicopter Propulsion Systems | – Les Systèmes Propulsifs des Hélicoptères |
| – Ramjets and Ramrockets for Military Applications | – Statoréacteurs et Statofusées pour Applications Militaires |

Structures and Materials Panel

- | | |
|---|--|
| – Corrosion and Corrosion Fatigue | – La Corrosion et la Fatigue sous Corrosion |
| – Maintenance in Service of High Temperature Parts and Dynamic Environmental Qualification Techniques | – Maintien en service des Parties soumises à de Fortes Températures et Techniques Dynamiques de Qualification en fonction de l'Environnement |

Technical Information Panel

- | | |
|--|---|
| – What Should Users Expect from Information Storage and Retrieval Systems of the 1980's? | – Que doivent attendre les Utilisateurs des Systèmes de Stockage et d'Extraction d'Informations dans les années 80? |
|--|---|

Lecture Series

- | | |
|--|--|
| – Dynamic Stability Parameters | – Paramètres de Stabilité Dynamique |
| – Microcomputer Applications in Power and Propulsion Systems | – Applications des Micro-ordinateurs aux Systèmes Energétiques et Propulsifs |
| – Personal Visual Aids for Aircrew | – Aides Visuelles Personnelles pour les Equipages d'Avions |
| – Electromagnetic Compatibility | – La Compatibilité Electromagnétique |
| – Multivariable Analysis and Design Techniques | – Techniques de Conception et d'Analyse à Variables Multiples |
| – Fatigue Testing Methodology | – Méthodologie des Essais de Fatigue |

Aerospace Applications Studies Committee

- | | |
|------------------------------------|--|
| – AASC Meetings and Working Groups | – Réunions de l'AASC et Groupes de Travail |
|------------------------------------|--|

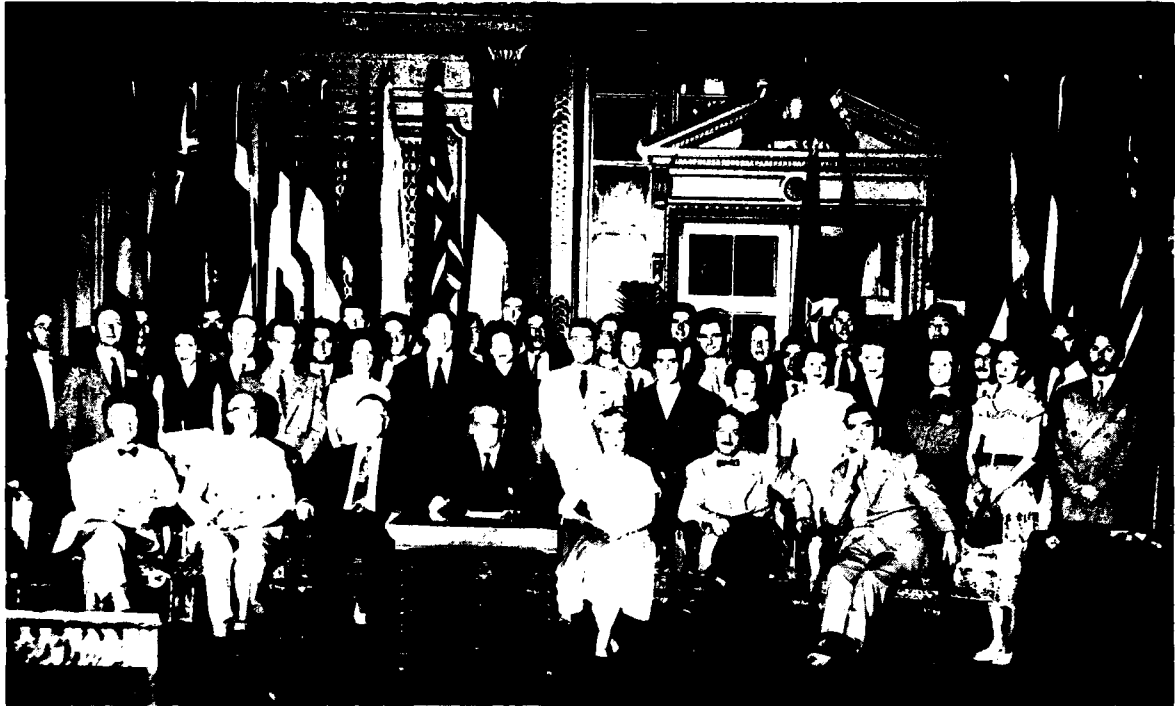
Headquarters

- | | |
|-------------------------------------|--|
| – AGARD Annual Meeting | – Réunion Annuelle de l'AGARD |
| – National Delegates Board Meetings | – Réunions du Conseil des Délégués Nationaux |
| – Steering Committee Meeting | – Réunion du Comité d'Orientation |
| – Panel Chairmen Meetings | – Réunions des Présidents de Panels |
| – National Coordinators Meeting | – Réunion des Coordonnateurs Nationaux |

Special Courses

- | | |
|---|---|
| – Flight Test Instrumentation Course | – Cours sur l'Instrumentation des Essais en Vol |
| – Modern Data Analysis Techniques in Noise and Vibration Problems with Particular Emphasis on Aeroacoustic Applications | – Techniques Modernes d'Analyse des Données dans les Problèmes de Bruit et de Vibrations – En Particulier, Applications Aéroacoustiques |

JUNE MERKER



JUNE MERKER, seated here in the centre of the picture, alongside Dr von Kármán, on the occasion of the Fifth General Assembly of AGARD held at the Chateau Laurier, Ottawa, Canada, in June 1955. (Dr Frank Wattendorf, one of the original AGARD team and erstwhile colleague of June Merker, who kindly prepared the note which follows, is seated on the other side of Dr von Kármán. Dr Wattendorf is the Honorary Vice-Chairman of AGARD – Ed.)

On 10 July, 1980, June Merker passed away in Dayton, Ohio, following surgery for a brain tumour. She had devoted a major portion of her career to the service of AGARD and its founder, Dr Theodore von Kármán.

June Merker was born and raised in Dayton, Ohio. She started her long career with the United States Air Force at Wright Field in the Foreign Technology Division. Her experience there served her well when she was assigned, after the war, to the Technical Section of the US Air Attache in Paris.

Dr von Kármán, Chairman of the US Air Force Scientific Advisory Board, was a frequent visitor to Europe in the immediate post-war years, with a mission of scientific reconstruction. When he was in Paris, the US Air Attache assigned June Merker to him as personal assistant. She was exceptionally helpful, and a lasting working relationship and friendship was formed. It was only natural that, in 1949, at Dr von Kármán's request, June was transferred from Paris to the US Air Force Scientific Advisory Board in Washington.

In Washington, June assisted Dr von Kármán greatly in the planning and implementation of AGARD. This

started taking form in January 1951, when Dr von Kármán convened a group of Aeronautical Research Directors from the NATO nations. Out of this meeting came the recommendation to NATO for the formation of an Advisory Group for Aeronautical Research and Development.

The creation of AGARD was approved by NATO in February 1952 and Dr von Kármán sent June Merker to Paris shortly thereafter, as the initial increment of an advance task force to establish the first AGARD office in the Palais de Chaillot; and to organize the First AGARD General Assembly in May, 1952.

June Merker remained with AGARD as Executive to the Chairman until the death of Dr von Kármán in 1963. Her activities extended beyond AGARD proper to include AGARD-stimulated bodies, such as: The Training Centre for Experimental Aerodynamics (now the von Kármán Institute); and the International Council for the Aeronautical Sciences (ICAS). She served as Personal Assistant to Dr von Kármán in his additional capacity of Chairman of both organizations.

AGARD gratefully acknowledges the many years of loyal and dedicated service of June Merker; and greatly mourns her passing.

PIER FRANCESCO CHECCACCI

PIER FRANCESCO CHECCACCI, who had served as a member of the AGARD Electromagnetic Wave Propagation Panel since May 1977, passed away on June 21, 1980. He was born in Firenze, Italy, on December 4, 1927.

In 1947 he graduated from the Technical Institute of Firenze and in 1964 received the PhD degree in Electromagnetic Waves. Since 1967 he had been given a course on Radio Physics at the University of Firenze.

From 1948 he had been a researcher at the Istituto di Ricerca sulle Onde Elettromagnetiche (IRDE, formerly Centro Microonde) of Consiglio Nazionale delle Ricerche (CNR), where he became research director. Recently the Physics Committee of CNR proposed him as the new director of the Institute.

Professor Checcacci served with various national and international scientific organizations, such as Commissione Radio Scientifica Italiana, COSPAR, AGARD, and URSI. He was also member of Società Italiana di Fisica and AEI. Among his activities within NATO he was the Scientific Director of an Advanced Study Institute and of a Lecture Series.

His work was chiefly concerned with microwave optics, antennas, optical fibers, ionospheric physics and space electronics, with important and original contributions which were appreciated at an international level. His extensive scientific work, reported in many publications, witnesses the breadth of his experience and the variety of his interests, which, together with a very large enthusiasm, made him a promoter and an organizer of unusual qualities.

His untimely death leaves a profound gap in the scientific community: in particular, the IROE has lost a highly-valued and respected colleague.

All members of AGARD, whether National Delegates, Panel Members or AGARD Staff, are cordially invited to submit articles likely to be of interest to other AGARD members for the next issue of AGARD HIGHLIGHTS which will appear in the Spring of 1981. Articles should be addressed to:

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